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A new species of *Hypoderma* with periphysoids

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Abstract — *Hypoderma mirabile*, a new species found on fallen leaves of *Litsea elongata* in China, is described and illustrated. This taxon is distinctive within the genus by the presence of periphysoids, unbranched curved paraphyses, and a unique covering stroma.

Key words — foliicolous fungi, morphological characteristics, taxonomy

Introduction

Hypoderma De Not. is one of the earliest described genera of *Rhytismatales*. It was established by De Notaris (1847) and proposed as conserved name by Cannon & Minter (1983). Höhnel designated *Hypoderma rubi* (Pers.) DC. as the lectotype species of the genus in 1917, and this viewpoint was subsequently accepted (Darker 1967; Cannon & Minter 1986; Korf 1988). Johnston (1990) emphasised the significance of the developmental and structural characters of the ascomatal sterile tissues rather than the ascospore shape to revise and expand the concept of *Hypoderma*. This genus is characterized by the presence of a preformed dehiscence mechanism, subcuticular ascomata, paraphyses that are never swollen, and ascospores that vary in shape.

Hypoderma is the third-largest genus in the *Rhytismataceae* (*Rhytismatales, Leotiomycetes, Ascomycota*), and of the 54 species known worldwide, many are widely distributed in the temperate and tropical zones (Kirk et al. 2008). The study of *Hypoderma* in China began in 1924 with the description of a new taxon, *Hypoderma strobicola* f. *cunninghamiae* Keissl., subsequently raised to species rank in 1947 as *H. handelii* Petr. (Keissler 1924; Petrak 1947). Afterwards, 13 additional species have been reported from China (Teng 1963; Tai 1979; Lin & Hou 1994; Lin et al. 2004; Liang et al. 2005; Hou et al. 2005, 2007; Hou & Piepenbring 2006; Wang et al. 2007).

Up to now, 5 species representing *Lophodermium* and *Coccomyces* in *Rhytismatales* have been recorded on *Litsea*, but no *Hypoderma* species has yet been reported on this plant genus (Farr & Rossman 2012).

Materials & methods

Macroscopic appearance was described under the dissecting microscope at 10–50× magnification. After rehydration of reference material in water for ca 10 min, 8–15 µm thick sections of mature fruitbodies were cut using a freezing microtome (YD-202, Yidi Medical Appliance Factory, Jinhua, Zhejiang, China). Sections were mounted in lactic acid or cotton blue with pretreatment in water for the observations of ascomatal and conidiomatal outlines in vertical section. The colours of various structures were observed in water. Gelatinous sheaths surrounding ascospores and paraphyses were examined in water or 0.1% (w/v) cotton blue in lactic acid. Measurements were made from more than 30 asci, ascospores, and paraphyses for each specimen using material mounted in 5% KOH or Melzer's reagent. Line and point integrated illustrations of external shape and internal structures of fruitbodies were drawn using a microscopic painting device (Panasoianic XSJ-2, Japan).

The type specimen is deposited in the Forest Fungi Dried Reference Collection of Anhui Agricultural University, China (AAUF).

Taxonomy

Hypoderma mirabile Y.R. Lin & C.T. Zheng, **sp. nov.** Figs 1–5

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Differs from *Hypoderma rubi* and *H. cordylines* by the presence of periphysoids, smaller asci and ascospores, unbranched, curved paraphyses, and a distinct covering stroma.

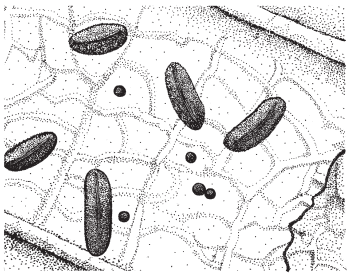
Type: China, Anhui, Tiantangzhai, Xibianwa, alt. 950 m, on fallen leaves of *Litsea elongata* (Wall. ex Nees) Benth. & Hook. f. (*Lauraceae*), 7 June 2007, J.J. Han & Y.R. Lin 2197 (**Holotype**, AAUF 68305).

Etymology: *mirabile* (Latin = fantastic), referring to the morphological peculiarity of this fungus which has unique periphysoids.

Colonies on both sides of leaves, forming distinct irregular, yellow-brown paler areas, 7–12 mm diam.

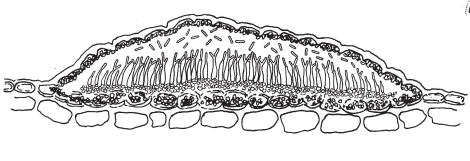
Zone lines somewhat frequent, dark brown, thin, surrounding or partly surrounding the pale areas, not always conspicuous.

Conidiomata on both sides of leaves, scattered, occasionally coalescent. In surface view, conidiomata 150–250 µm diam., rounded or subrounded, somewhat raising the substratum surface, dark brown to black, but lighter coloured in immature conidiomata, with a surrounded black perimeter line, discharging spores through an inconspicuous central ostiole. In vertical section, conidiomata subcuticular. Upper wall poorly developed, composed of textura epidermoidea with tiny, thin-walled cells. Basal wall 3–7 µm thick, comprised of textura globulosa-angularis. Subconidiogenous layer



1

1mm



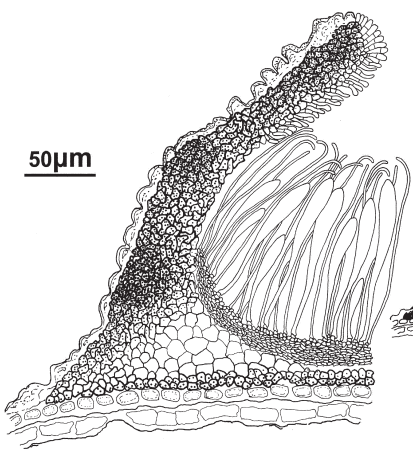
2

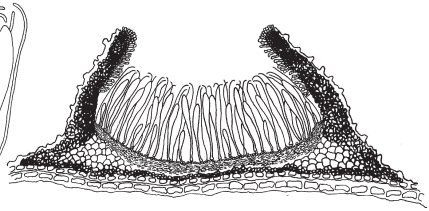
50µm

5

20µm

50µm





100µm

3

4

Figs 1–5. *Hypoderma mirabile* on *Litsea elongata*. 1. Fruitbodies and a zoneline observed under a dissecting microscope. 2. Conidioma in vertical section. 3. Portion of ascoma in median vertical section. 4. Ascoma in median vertical section. 5. Paraphyses, asci, and ascospores.

ca 6 µm thick, consisting of 3–4(–5) layers of hyaline, thin-walled angular cells. Conidiogenous cells 8–14 × 2–3.5 µm, cylindrical, tapering towards the apex, proliferating sympodially or occasionally proliferating percurrently. Conidia 4–6 × 1–1.5 µm, cylindrical, hyaline, unicellular.

Ascomata in similar positions to conidiomata on the substratum, scattered over the pale areas. In surface view, ascomata 1000–1700 × 500–650 µm, elliptical to elongated-elliptical, straight or somewhat curved, ends rounded or obtuse, black, slightly raising the substratum surface, opening by a single longitudinal split 3/4–4/5 the length of the ascoma. Lips moderately developed. In median vertical section, ascomata subcuticular. Covering stroma 20–30 µm thick near the opening, increasing to 50–55 µm thick not far away from the base, composed of dark brown textura angularis-epidermoidea with thick-walled cells 5–8 µm diam., connecting to the basal stroma. Lips with a layer of cells 7–14 × 3–4 µm, cylindrical, thin-walled, hyaline, 0–1(–2)-septate. Periphysoids lined on the inner face of the covering stroma, 15–18 × 2–3 µm, cylindrical, straight or curved, frequently swelling at the top, hyaline, 0–2-septate. Basal stroma 5–8 µm thick, dark brown, consisting of 1–2 layers of angular, thick-walled cells. Subhymenium moderately developed, 10–22 µm thick, comprised of hyaline textura porrecta with a region of colourless, gluey textura angularis with thin-walled cells 11–14 µm diam. at the edge of the ascoma. Paraphyses 125–140 × 1–1.5 µm, filiform, aseptate, unbranched, often curved but not swollen at the apex, covered with a 0.5–1 µm thick gelatinous coating. Asci ripening sequentially, 80–120 × 8.5–12 µm, cylindrical-clavate, long-stalked, thin-walled, apex rounded, without circumapical thickening, J–, 8-spored. Ascospores biseriate or irregularly arranged, confined to upper half of the ascus, 12–19 × 2.2–3 µm, cylindrical to cylindrical-clavate or clavate, hyaline, aseptate, with a gelatinous sheath ca 1 µm thick.

Host species, habitat and distribution: Producing conidiomata and ascomata on fallen leaves of *Litsea elongata*. Known only from the type locality, Anhui Province, China.

Comments — The periphysoidal layer is a structure similar to the lip cells present in some other species of *Rhytismatales*. This structure supposedly helps the covering stroma open when wet and close upon drying (Sherwood 1980). Except for a few *Coccomyces* and *Lophodermium* species (Johnston 1986; Sherwood 1980; Spooner 1990, 1991; Lin 1998; Lin et al. 2002), most rhytismatalean taxa, especially *Hypoderma* species, lack periphysoids. We recognize *H. mirabile* as a new species mainly due to its obvious periphysoidal layer.

Hypoderma rubi, which produces macroscopically similar ascomata, conidiomata, and zone lines and similarly shaped asci and ascospores, differs from *H. mirabile* in its covering stroma without periphysoids and sharply

narrowing from the edge of the opening, septate branched paraphyses, asci (87–130 × 12–14.5 μm), and ascospores [(16–)20–24(–30) × 2.5–3.5 μm] lacking an obvious gelatinous sheath (Cannon & Minter 1986).

The similar *H. cordylines* P.R. Johnst. is distinguished from *H. mirabile* by its covering stroma composed of angular cells that thins gradually or more or less abruptly toward the outside ascomal edge, well-developed lips, loosely circinate paraphyses tips, larger asci (90–140 × 11–16 μm) slightly thickened at the apex, uniform elliptic ascospores, the absence of an upper wall in the conidiomata, and much longer conidia (5–9 μm) (Johnston 1990).

From our observations, it seems likely that this new species is a weak parasite or a saprobe.

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